MULTIMEDIA UNIVERSITY

TABLE NO | | |

STUDENT ID NO | | | | | | | | | | |

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2022/2023 (TERM ID 2210)

TSE3151 – SOFTWARE DESIGN

(All sections / Groups)

15 FEBRUARY 2023
2:30 p.m – 4:30 p.m
(2 Hours)

Question	Mark
A	
B	
C	
D	
Total	

Examiner 1 Signature: _____

Examiner 2 Signature: _____

Examiner 3 Signature: _____

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **10 printed pages** (including cover page).
2. Answer **ALL** questions in **SECTION A, SECTION B, SECTION C and SECTION D**. The distribution of the marks for each question is given.
3. Write all your answers in the **CLEARLY** in the specific answer box provided for each question. Submit this question paper at the end of the examination.

STRUCTURED QUESTIONS (50 MARKS)

SECTION A [15 MARKS]

Consider the following **SingletonPatternEx.java** program.

```
// SingletonPatternEx.java
package singleton.pattern.demo;

class MakeACaptain
{
    private static MakeACaptain icaptain;
    //We make the constructor private to prevent the use of "new"
    private MakeACaptain() {}

  private static class SingletonHelper{
  //Nested class is referenced after getCaptain() is called
    private static final MakeACaptain icaptain = new MakeACaptain();
  } //end class SingletonHelper

  public static MakeACaptain getCaptain()
  {
    return SingletonHelper.icaptain;
  }
} //end class MakeACaptain

class SingletonPatternEx
{
    public static void main(String[] args)
  {
            System.out.println("***Singleton Pattern Potter***\n");
            System.out.println("Trying to make a captain for our team");
            //Put your code here
            }
}
```

Based on the above context, answer the following questions Q-A1 to Q-A3:

A1. **Rewrite the method** main() of **SingletonPatternEx.java** to produce the following output by **creating two instances of singleton** and **comparing** whether they are the same instance.

*F:\YourName>**javac singleton\pattern\demo\SingletonPatternEx.java***
*F:\YourName>**java singleton.pattern.demo.**SingletonPatternEx*
****Singleton Pattern Potter****
Trying to make a captain for our team
Trying to make another captain for our team
c1 and c2 are same instance

(5 marks)

Continued...

Answer

A2. **Draw** a **Class Diagram** to show TWO relationships within these two classes, plus the attributes and methods. In your class diagram, please **write clearly what kind of relationships do they represent**, *whether they are inheritance, dependency, implementation, aggregation, or composition (strong aggregation).*

(5 marks)

Answer

Continued...

A3. There are TWO situations on what do we need to do to incorporate thread safety in the above Singleton implementation.
A3a. For the first situation, explain how we use of the "synchronized" keyword, and its disadvantage.

(1 mark)

Answer

A3b. For the second situation, explain the THREE steps of eager initialization for class **MakeACaptain** with the instance of ***icaptain*** to achieve thread safety. What is its advantage?

(3 + 1 mark)

Answer

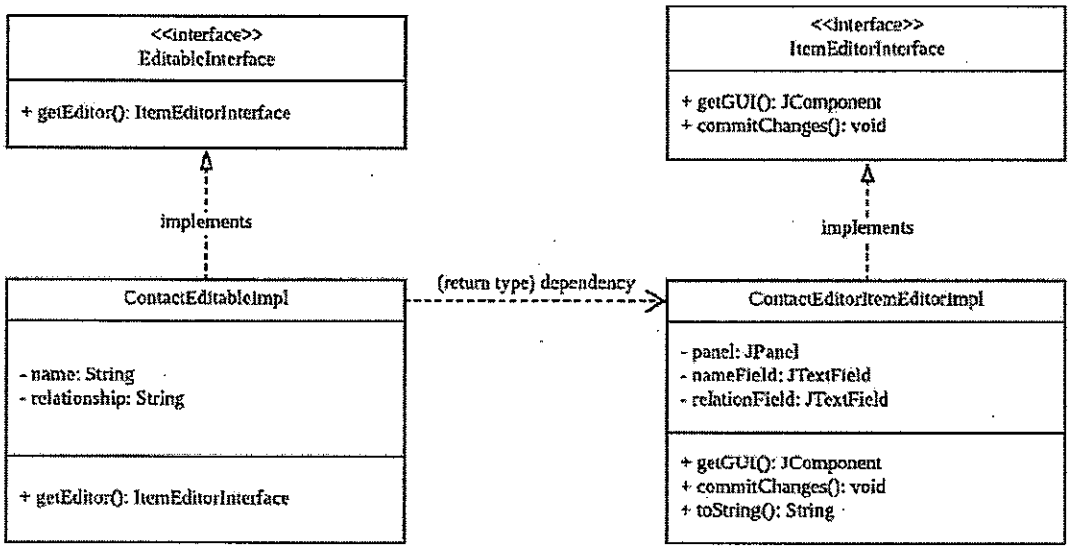
Continued...

SECTION B [15 MARKS]

Among the name in the **Factory Method** Design Pattern (DP) include *Creator*, *ConcreteCreator*, *factoryMethod( )*, *Product*, and *ConcreteProduct*.

Based on the above context, answer the following questions Q-B1 to Q-B2.

B1. Write a table to show the mapping of the **Factory Method** DP to the example given in the following class diagram.



(5 marks)

Answer

Continued...

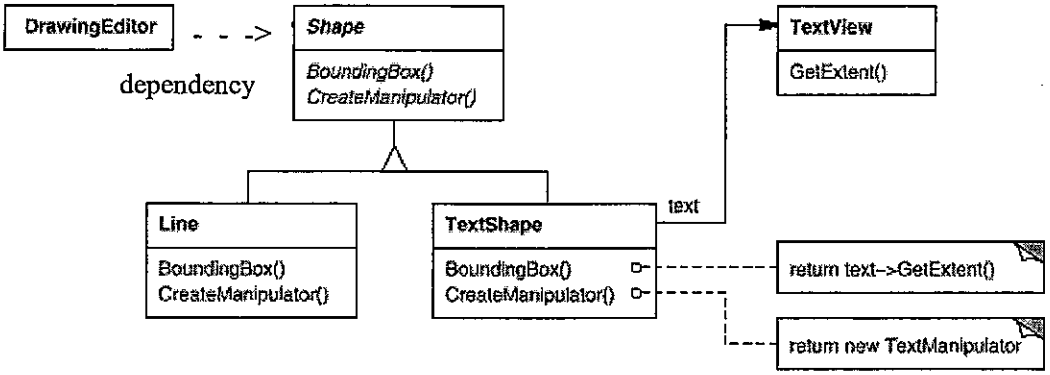
B2. Draw a class diagram for the typical Factory Method DP with the name in DP of *Creator*, *ConcreteCreator*, *factoryMethod( )*, *Product*, and *ConcreteProduct*.

(6 marks)

Answer

Continued...

B3. Write a table to show the mapping of the **Adapter** DP to TextShape and TextView Motivation Example given in the following class diagram. Among the name in the **Adapter** Design Pattern (DP) include *Adaptee*, *adapteeMethod( )*, *Target*, *targetMethod( )*, *Adapter*, *adapteeAggregationVariable*, and *Client*.



(4 marks)

Answer

Continued...

SECTION C (10 MARKS)

C1. You are asked to plan a journey by air from Kuala Lumpur in Malaysia to Seoul in South Korea.
Airline A is cheap, but involves flying to Bangkok, waiting there for five (5) hours and then flying on to Seoul. Airline B is the most expensive but offers a direct flight. Airline C has a package that is cheaper than that of airline A but involves flying from Kuala Lumpur to Taipei and then to Seoul via yet another airport in Taiwan.

List FOUR factors besides price which will affect your choice of airline? These choices would subsequently be focused on the airline software design.

(2 marks)

Answer

C2. Describe EIGHT criteria that qualifies software design as a wicked problem. *Note that "wicked problems" help to form the foundation principles for a software designer to be critique for knowing what to look for when a possible design is given.*

(8 marks)

Answer

Continued...

SECTION D [10 MARKS]

D1. Consider a physical building electrical grid design used with a software aided design system. Describe the following:
(D1a) THREE viewpoints that might be needed to provide a full design description.

(3 marks)

Answer

(D1b) FOUR representations with examples that could be used for these design descriptions.

(2 marks)

Answer

Continued...

D2. Consider the deliverables at all stages for the Software Supply Chain (SSC). An organization should validate and standardize the choice of IDEs (Integrated Development Environments), compilers, artifacts, and dependencies used throughout the development flow. This task can be difficult, and this form of defense may be incomplete; hence the safest measure is a control at the source code level such found in Java or C++ code.

As such, future solutions need to consider standards, such as International Organization for Standardization, which impose different software design requirements, for example, partitioning and resource isolation levels, full control over communication channels, and the development of auditing mechanisms.

Based on the above scenario, answer questions Q-D2a to Q-D2b:

(D2a) Explain TWO reasons in favour of standardizing any form of design description.

(2 marks)

Answer

(D2b) Explain THREE reasons against standardizing the same form of description.

(3 marks)

Answer

End of Page.